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Environmental Restoration and Base Closure: How Clean is Clean Enough?

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ABSTRACT

Environmental Restoration and Base Closure:

How Clean is Clean Enough?

Claudia Tornblom

This paper examines the statutory foundations of the Department of Defense (DOD) base realignment and closure program and the environmental restoration programs of DOD and the Environmental Protection Agency. It also identifies the goals of both programs, the criteria for attaining those goals, and conflicts between the goals of the two programs. Insights to aid in answering the question "How clean is clean enough?" are discovered through review of economic theory, risk management principles, and consideration of decisions made in the process of cleaning up several military installations contaminated with hazardous and toxic wastes.

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INTRODUCTION

A critical relationship exists between the Government's efforts to dispose of military installations that are no longer needed and its programs to cleanup hazardous and toxic wastes, "Environmental Restoration." The link between these programs sometimes has been characterized by the question, "How clean is clean?" The answer to this question is presumed to derive from laboratory and epidemiological studies of the health and ecological effects of various contaminants. However, in the reality of ten years of identifying contamination and attempting to devise appropriate responses, it has become clear that, in many cases, the ultimate question must rather be "How clean is clean *enough*?" This question recognizes the current limits of technology and the weighing of costs and risks. It recognizes that one's view of cleanup standards is based not only on scientific and statistical analyses, but also on values and judgments.

Environmental restoration of military bases identified for closure proceeds in the context of multiple laws, both Federal and state, and of agencies with differing substantive and

procedural requirements. Complicating the technical assessment of contamination and alternatives for cleanup at any particular site are the concerns of the local people. They are concerned not only about health and safety, but also about the economic impact base closing will have on their community and opportunities for reuse of the land. In addition, like nearly all activities that human beings and societies engage in, environmental restoration takes place in a climate of constrained resources--money, time, technical expertise--and conflicting demands for them.

CONTAMINATION AT MILITARY BASES

Military bases present three primary types of chemical contamination: contamination of soils with solvents, contamination of soils with explosives, and contamination of groundwater with either, or both, of the above. In addition, military bases with firing ranges and proving grounds are contaminated--some up to 10 feet deep--with unexploded ordinance.

Any given military installation may have numerous different *sites* of contamination. In a 1992 briefing for senior Army leadership, the Army Corps of Engineers reported that the number of such contaminated sites is estimated by DOD to be more than 17,000: 10,459 Army; 2,253 Navy; 4,513 Air Force; 257 Defense Logistics Agency. This briefing estimated the costs of cleaning up domestic military bases to be in the range of: $500 million to clean up solvent soils; $2 billion to $3 billion to clean up

explosive soils; and more then $6 billion to clean up the groundwater (Hatch, 6). Other Army briefings have estimated cleanup costs to be as high as $25 billion (Defense Priority Model, 5).

The environmental record of the military services suggests a presumption that, when it comes to environmental regulation, the military's national defense mission places it above the law. In 1990, the Army War College conducted a *Strategic Outreach Program Roundtable Conference on the Army and the Environment.* In its report, whose conclusions are equally applicable to all military services, the conference criticized the Army for not holding installation commanders accountable for environmental performance and for not complying with environmental laws until faced with threats of enforcement action by the EPA or state agencies (7).

Unlike private industry--which responded to environmental cleanup legislation because of the financial and public relations costs of noncompliance--"...because the Army had been protected from financial and legal penalties due to noncompliance, it has not made environmental issues a high priority" (Roundtable, 11). The conference concluded that the Army must stop disregarding its environmental responsibilities "...if it hopes to secure other forms of support for its programs from Congress, States, and the public" (15).

At some sites, the level of restoration that ultimately can be attained may turn on technological capability, rather than on cost. At many military installations, the witch's brew of

hazardous and toxic chemicals, perhaps with radioactive material mixed in, defies readily available technological means of cleaning up the site. Although the idea of permanently restricting access to a site, rather than cleaning it up, is extremely offensive to many Americans, it is becoming clear that in some instances, we do not appear to have a choice.

Nowhere is the military's past disregard for environmental pollution control laws more exposed than in the base closure process. This paper considers only the cleanup of domestic bases, at which there was never a question whether U.S. environmental laws apply. The condition of U.S. military bases outside the U.S. are understood to be contaminated to a far greater extent, arguably as a result of the fact that neither U.S. laws nor the laws of host nations were enforced. The U.S. currently faces a significant international relations problem, particularly in Europe, over the contamination caused by military installations (Los Angeles Times).

The costs of the military's past disregard of the environment must be confronted, along with a weighing of the costs and risks of various ways of responding, from doing nothing--that is, accepting national sacrifice zones--to restoring the land and water at these sites to a "clean" condition.

BASE CLOSURE LAW

The U.S. military is undergoing significant downsizing and restructuring. Even before the demise of the U.S.S.R., it was

recognized that the U.S. could no longer afford to maintain the great number of inefficient military installations that had grown up over the years. However, past efforts to close installations have frequently been overturned by Congress.

The difficulty of closing unneeded military bases derives from their significant beneficial effect on local economies and the fact that each base, by definition, exists in one clearly identifiable location: some particular congressional district. The difficulty arises not so much from a strong belief by that district's congressional representative in the objective merits of keeping the base open as it does in the political impossibility of taking any action other than outright opposition to the proposal. Even professing neutrality on a base closure would subject the incumbent to tremendous jeopardy in the next election.

Base Closure Act of 1988

Despite the difficulties of closing military bases, the Secretary of Defense established a Commission on Base Realignment and Closure (BRAC) to review military requirements and identify installations that should be closed, or whose missions should be modified, in order to efficiently provide for current and future national defense requirements. The charter for this commission was signed by the Secretary on May 3, 1988. In October of 1988, Congress enacted legislation prohibiting closure of bases as recommended by the Secretary's BRAC Commission, until fulfillment

of a modified commission review process conducted in accordance with specified procedures.

Under the process that was enacted into law, representatives would not be forced to vote on whether to close any individual base. In fact, each representative could vociferously object to a closure in his or her district and call for hearings, but unless a majority in both houses of Congress could be mustered within a limited time period, the closures would go forward, and each representatives could claim to have spoken out to defend the home territory.

Title II of the 1988 Defense Authorization Amendments and Base Closure and Realignment Act (P.L. 100-526), required the Secretary of Defense to publicly establish criteria for base closure and to present recommendations to a Commission on Base Realignment and Closure (BRAC), whose members were to be appointed by the Secretary. The BRAC Commission, in turn, was to evaluate DOD's recommendations, determine whether it had properly applied the established criteria, and make its own recommendations the President and to Congress. Congress then would have 45 days to consider the package as a whole and either accept or reject it. Changes to the package were not to be allowed.

Environmental Impact Assessment of Base Closure Plan

The 1988 act waived application of the National Environmental Policy Act (NEPA) to the general base closure process and

modified application of NEPA to the subsequent actions that would be taken to actually realign or close bases. This modification limited the time allowed for bringing civil actions under NEPA to 60 days after public notification of the intended action. According to the 1988 BRAC Commission, which became known as BRAC I, the rationale for waiving application of NEPA to the overall base closure process was to "...prevent environmental requirements from being used inappropriately to block base closures or realignments." (1989 Report, 23)

Base Closure Amendments of 1990

The base closure process was amended by the Defense Authorization Act of 1990 (Public Law 101-510). These amendments directed the Secretary of Defense to publicly announce the criteria that would be used to guide base closure recommendations, to submit a 5-year force-structure plan with each of the subsequent three biennial budgets, and to convene a task force to identify opportunities for improved interagency coordination in the base closure process.

Another significant change made by the 1990 Base Closure Amendments was the establishment of a separate funding source for environmental restoration related to base closure. Under the 1988 law, closing bases had to compete for funds with all other base cleanup candidates nationwide. Appropriations for fiscal year 1991 provided $100 million in the base closure account to be used exclusively for environmental restoration of the sites

ENVIRONMENTAL RESTORATION LAW

The majority of environmental laws take the form of constraints on development decisions and manufacturing processes. In contrast to these environmental *protection* statutes, environmental *restoration* is directed at the cleanup of hazardous and toxic wastes--that is, correcting or mitigating the mistakes of past development and manufacturing and waste disposal.

In general, the Federal Government's position regarding mitigation of past environmental damage--particularly that caused by large public works projects--has been that the environmental impact was the price of development, and the Government should not go back now and try to compensate for it. This policy, while objected to by environmental lobbying organizations, some Federal agencies and many individual Federal workers, is reflected in laws and policies spanning a number of administrations of both parties. The case of Love Canal changed that view, at least at it applies to hazardous and toxic wastes.

Love Canal was a crisis of both personal health and public confidence. In its wake, the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)--also known as "Superfund"--was pushed through Congress in the last days of the Carter Administration. Even that environmentally proactive Administration was drawn reluctantly into the issue, fearful of the ultimate cost of cleaning up the wastes. The cost estimates they so feared have turned out to be underestimated by orders of magnitude.

Later, in 1986, after months of negotiation between Congress and Executive Branch and numerous veto threats, the Superfund Amendments and Reauthorization Act (SARA) was passed, extending the Superfund authority, codifying certain EPA policies and procedures, increasing the five-year funding authority, and addressing several controversial aspects of the program, particularly the extent of liability.

According to Jan Paul Acton, in his 1989 book on CERCLA published by the Rand Corporation's Institute for Civil Justice, the "polluter pays" principle in CERCLA, with its reliance on "strict, join-and-several, and retroactive liability," is based on both efficiency and justice (2). Acton characterizes the purposes of CERCLA as three-fold:

- to deal with emergencies arising from abandoned wastes and waste sites;
- to provide long term clean-up; and
- to encourage future responsibility (3).

A Federal interest-bearing revolving fund was established by CERCLA to receive the taxes the act imposed on industry. This "Superfund" was to be the source of funding for 90 percent of the costs of addressing the cleanup of the contaminated sites on private property if the liable parties were either unknown or unable to pay. States were required to pay 10 percent of actual cleanup costs and to assume operation and maintenance of completed projects. The requirements of CERCLA apply to Federal land, but Federal agencies may not access the Superfund account

to pay for cleanup costs. Each Federal agency must request through the President's budget and receive from Congress the appropriations necessary to clean up contamination on land for which that agency is responsible.

Criteria for Environmental Restoration Remedies

Under CERCLA, all cleanup measures--called remedies or remedial actions--must, overall, be protective of human health and the environment; that is, they must reduce risks over time. In addition, all remedies selected must comply with "applicable, relevant and appropriate requirements" for the contaminants and conditions at that site. These are the first 2 of 9 criteria stated in Section 121 of CERCLA and in EPA guidance for judging and comparing potential remedies (Study Guidance, 6.3-6.13). These two criteria establish a mandatory threshold for all eligible remedies.

Five additional "primary balancing criteria," which are directed at controls to manage failure and risks, are to be used in comparing alternative remedies. These balancing criteria describe characteristics required of remedies, which:

- must have long-term effectiveness and permanence;
- must reduce toxicity, mobility, or volatility through use of treatment (as opposed to merely moving the hazard to another site);

- must have short-term effectiveness (that is, must protect human health and the environment during construction and implementation);
- must be implementable; and
- must be achievable at a cost deemed justified, considering both implementation costs and operation and maintenance costs.

Finally, two additional criteria are considered after a remedy has been tentatively selected on the basis of the above considerations. These criteria--State acceptance and community acceptance--are considered after receipt of comments on the draft report and recommendations, in order to assure that State and local preferences are considered in the final remedy selection stated in the "Record of Decision." However, EPA is consistently clear that it, not the State or the community, has the final decision authority on remedy selection.

Applicable, Relevant and Appropriate Requirements

In 1986, the SARA modified CERCLA to establish a hierarchy of standards to guide the setting of "remediation goals"--levels of cleanup to be attained--for the cleanup of hazardous and toxic wastes. The standards are known collectively as "applicable, relevant and appropriate requirements", or ARARs. In determining ARARs for a particular site, the manager first looks to "Federal standards, requirements, criteria, or limitations" legally applicable to the site, as well as any State standards that may

be more stringent (EPA, Study Guidance, 1.4). If no applicable standard is found, the manager then looks to situations that are comparable to identify standards that may be "relevant and appropriate" to the site at hand.

ARARs may be chemical-specific, such as maximum contaminant levels (MCLs); location-specific, such as preservation of an historic property; or action specific, such as a reporting or public notice requirement. If the situation is such that additional remediation goals are needed, the project managers are to consider any interim chemical-specific standards in the process of being promulgated, additional policy and procedural guidance in EPA documents, and activities underway at laboratories.

There are six conditions, specified in Section 121(d)(4) of CERCLA, where ARARs can be waived. These are summarized in EPA guidance as follows: (1) the action is part of a larger plan which will meet ARARs; (2) an option is available that would result in less risk than the compliance with the ARAR; (3) compliance is not technologically practical; (4) a different method will achieve a comparable result; (5) the ARAR exists in State law, but has not been consistently enforced; (6) the cost is so great that it would adversely affect the ability to cleanup other sites (EPA Study Guidance, 1-4). The last condition applies only to cleanup of private land, which may be funded out of the Superfund account.

Defense Environmental Restoration Program

The Defense Environmental Restoration program (DERP) was established in 1984 under temporary, limited authority in annual appropriations acts, "...to promote and coordinate efforts for the evaluation and cleanup of contamination at DOD installations" (DOD Annual Report, 1990). Section 211 of SARA, the 1986 amendments to CERCLA, provided permanent authorization for DERP and funding mechanism for addressing cleanup of DOD installations. Although DERP is the responsibility of the Secretary of Defense, it is to be carried out "within the overall framework" of CERCLA, with appropriations derived from Defense appropriations acts.

ECONOMICS OF ENVIRONMENTAL RESTORATION

In its CERCLA enforcement program, EPA--through the Department of Justice--assigns liability to the parties who caused the contamination or who owned or operated the contaminated property at, or subsequent to, the time the contamination occurred. If those parties cannot be located or are unable to pay the cleanup costs, the Federal "Superfund" provides a means of passing the costs on to current producers of hazardous and toxic chemicals, who are taxed to capitalize the fund. Presumably, they in turn pass some or all of the tax on to purchasers of their products, thus increasing the cost of using hazardous and toxic chemicals.

Views of Natural Resource Economists

Actions of individual decision-makers can be affected government intervention that relies on enforcement through the legal system, on incentives through the economic system, or on a combination of both (Smith, 379-380). Reliance on the legal system entails enactment of mandates and penalties, surveillance and enforcement through damage suits in the courts. This system can be effective, but it is very expensive. In addition, there may be built-in incentives for evasion and deceit.

Reliance on the economic system could take the form of pollution charges or of non-pollution incentives. Economists normally take the view that it is more efficient to establish financial incentives for individuals to achieve a desired result than to mandate a particular means of achieving the result. For example, offering a subsidy for recycling hazardous materials would produce more efficient, competitive solutions than would imposing a disposal charge, which in turn would be more efficient than mandating a disposal limit or requiring installation of a particular technology (Howe, 249-252). Controls can be set up to establish an acceptable outcome, but leave to the producer the decision on how best to achieve it.

Externalities. Environmental pollution, like depletion of a natural resource, is usually considered to be an unintended effect, an externality, which the producer did not take into account and for which the producer does not bear the cost. However, environmental externalities have impacts on public

goods, such as clean air, clean water and adequate open space. At some point on a continuum of severity of impact, the issue moves from being one of simple externalities to one of private consumption of public goods. Since market forces do not, even in theory, optimize consumption or protection of public goods, governments intervene.

Many environmental protection statutes attempt to force decision makers to explicitly account for and to avoid or minimize the unintended, adverse effects that their activities would have on society and the natural environment. In economic parlance, this would force the decision makers to internalize into their cost-benefit analyses the negative externalities of their intended actions.

In contrast, environmental restoration statutes address existing situations where those negative effects were not accounted for or avoided. Environmental restoration law creates a mechanism for retroactively "internalizing" these costs, if not to the specific polluters, then at least to the industry.

Waste Assimilation Capacity as a Resource. In one of the classic papers on economics and environmental impacts, "Production, Consumption and Externalities," Robert Ayers and Allen Kneese describe the waste assimilation capacity of the environment as an important natural resource (282-283). They argued that adverse environmental impacts are not merely an occasional, inadvertent incident, but rather that "technological external diseconomies are...an inherent, normal part" of the

processes of production. They further argued, invoking the law of conservation of mass, that contamination of the environment really represents the uncompensated private use of a common property--that is, owned by the general public--resource: the assimilative capacity of the environment.

Ayers and Kneese present a mathematical defense of their conclusion that, in addressing the contamination caused by disposal of residual materials from production processes, one must not look at each environmental media--air, water, soil--in isolation, but rather must examine the impact on the total environment. The optimal methods and levels of control of contamination, they assert, cannot be derived through ad hoc taxes and restrictions.

Marginal Cost Analysis of Cleanup Spending

Just as trade-offs must occur between Federal spending for military activities and civil activities, and between domestic and international programs, so must trade-offs occur between spending for environmental restoration and spending for other programs. Even within a broadly defined "environment and safety budget," trade-offs must occur: spending more for cleanup of toxic contamination may mean less funding is available for protection of endangered species habitat or for research into renewable energy sources.

In the broader context of the entire U.S. economy, spending to clean up hazardous and toxic contamination to levels

considered protective of human health and the environment represents, in the short run, a reduction in spending available to shelter the homeless, provide student loans, enforce the criminal code, support the arts, reduce the deficit, or reduce taxes. In the President's Budget for Fiscal Year 1992, it was estimated by the U.S. Office of Management and Budget (OMB) that Federal Government regulations--the vast majority of which are related to health and safety, broadly defined--result in direct costs to the private sector and to State and local governments of $185 billion annually.

Economic Incentives in Environmental Standards

Controversy has long existed over the theoretical basis of environmental standards in, or derived pursuant to, various statutes. It is instructive also to examine the economic impact and incentives that result from different kinds of standards.

For example, the Clean Air Act includes both contaminant level and technology-based standards, which result in different economic incentives. Contaminant level standards restrict concentrations of certain chemicals at the point of release into the environment, such as an automobile exhaust pipe or a power plant smokestack. The act also requires coal-fired power plants to install stack scrubbers, which remove from the exhaust gas most of the hazardous and toxic substances that would have adverse health and environmental effects.

A technology-based standard requires the installation and use of specific equipment, regardless of the cost. The equipment specified is usually considered to be the bast available at the time of regulation. This kind of regulation makes no distinction between efficient and inefficient producers, nor between those who may have already undertaken other measures voluntarily to reduce pollution. The principal drawback of a technology-based standard, however, is the it does not create an incentive to develop even better technological methods that may be more effective and efficient than the method specified.

On the other hand, a contaminant level standard specifies the outcome that must be attained and defers to the producer the task of finding the best means of achieving it. In theory, there are two benefits to this type of regulation: It encourages the regulators to focus on the outcome--the improvement in health, reduction in risk, or protection of environmental value--which was the justification for the regulation in the first place. It stimulates the market to develop better technological methods and rewards the most efficient producers of the environmental protection with increased profits.

The realization of these benefits depends heavily on whether the regulators set the standard correctly, that is, whether the contaminant level specified is protective of human health and the environment. This points to the importance of good science and risk assessment. However, it must be recognized that

determinations of acceptable risk and the setting of standards that impose costs on society are ultimately political decisions.

RISK MANAGEMENT

A fundamental analytical, but ultimately subjective, process underlies both technical and economic consideration of cleanup standards: risk management. It is often stated that everything in life involves risk. While true, the statement offers no assistance in making decisions about risk, particularly decisions by public bodies that may have health and safety impacts, financial impacts, and freedom of movement impacts on the general population.

Risks are normally analyzed by the technique of probabilistic risk assessment. This method multiplies the likelihood of the occurrence of an event by the consequences if it should occur. This method could be used to determine the chance of a single individual suffering the consequences of the event occurring. Although a necessary beginning point, this method has not been sufficient to assist people in making decisions about how much risk is acceptable, particularly when a public body is making the decision for society.

In its recent report to the Secretary of Energy, the Advisory Committee on Nuclear Facility Safety--which was commissioned by the Secretary of Energy to examine and report on the Federal defense nuclear industry--stated that there are 3 steps in a proper risk analysis. First, the hazards must be identified and

characterized. Second, vulnerabilities must be quantified and their significance analyzed. Third, the above hazard identification and risk assessment must be used to "eliminate, reduce or mitigate the risk." This third step is risk management, according to the committee (15). The Advisory Committee on Nuclear Facility Safety noted the importance of conducting cost-risk benefit analyses or value-impact assessments.

According to Dr. John Ahearne, who chaired the Advisory Committee on Nuclear Facility Safety, merely knowing the likelihood and consequences of an event is inadequate to achieve consensus in public decisions on acceptable levels of safety. Other factors to be considered include whether exposure to the event is a voluntary act of the person exposed; whether the risk and consequences are known to the individual making a decision whether to become exposed; and whether consideration of the event evokes dread.

Managing Risk through Regulation

The Government addresses risk, primarily risks to health and safety, through regulatory action. For the last decade, the Federal Office of Management and Budget (OMB)--through its Office of Information and Regulatory Affairs--had played a prominent role in the management of Federal regulatory activities. OMB's controversial mission in this regard it a delicate mix of policy

review, efficiency assessment and defender of the private sector against "burdensome" Federal regulations.

In the Budget of the United States for Fiscal Year 1992 is an attempt by the OMB to present, in a readily understandable way, the concept and implications of risk management. In a rather extensive presentation, OMB displays data on the costs of regulations to avoid adverse effects due to exposure to various kinds of risk, ranging from various kinds of transportation safety regulations to worker safety to health risks of exposure to carcinogens.

In this presentation, OMB provides information to support its assertion that in considering the regulation of risks, one must conduct a cost-benefit analysis, as well as a risk assessment. For a variety of Federal regulations, OMB translates this risk calculation into an estimate of the frequency that the event in question would cause one "premature death." OMB then brings into the equation the estimate of direct costs born as a result of the regulation of the event, and produces an estimate of the cost of protecting one person from premature death caused by the regulated event.

In this discussion, OMB states its intent to support risk management activities by agencies and ultimately to be in a position to weigh the public health benefits of one program against those od another program, to determine the optimal levels of investment in each.

Risk Management through Prioritization

National Priorities List. The CERCLA program compiles a National Priorities List (NPL) of the sites considered to be the most contaminated in the country. Decisions to list a site on the NPL are made on the basis of preliminary site investigations. In order to be eligible for Federal Superfund funding, a site must be listed on the NPL. In a deft political move, EPA regulations allow each State to place on the list one site which would not be listed on the basis of only its contamination rating. Although Federal, state, and private properties may be listed on the NPL, Federal properties are not eligible for funding from the Superfund account. The costs of cleaning up these facilities must be borne by the budget of the agency that is responsible for the site.

Of the 14,000 sites identified by DOD as potentially needing restoration, 96 are listed on EPA's National Priorities List of the most contaminated sites in the country. For these sites, specific levels or oversight, coordination processes and time limits in EPA regulations apply. Both BRAC I and BRAC 91 included in their recommendations for base closure numerous sites contaminated enough to be on EPA's NPL.

In the face of limited funds, time and technical expertise, prioritization is a valid tool for risk management. The cleanup of hazardous and toxic wastes, there are two prioritization models that are used to accomplish similar, but not identical

purposes. The two models are EPA's Hazard Ranking System (HRS) and DOD's Defense Priority Model.

Hazard Ranking System. The primary purpose of the Hazard Ranking System (HRS) is to determine whether a site should be listed on the NPL and, thereby, be eligible for Federal financing or enforcement effort. Under EPA's revised HRS, promulgated in 1991, a HRS score of 28.5 or greater automatically results in listing of the site on the NPL. The HRS uses data gathered in the preliminary assessment and site investigation to determine risks associated with three migration pathways--groundwater, surface water and air, as well as exposure to contaminated soil and through the human food chain.

Defense Priority Model. Since DOD is responsible for cleaning up contamination at all military bases and since no Federal facility cleanup can be financed by the Superfund account, determining eligibility for Federal funding is not the purpose of the Defense Priority Model (DPM). Rather, it is used to determine priorities for allocation of limited cleanup funding, based on the results of remedial investigations and feasibility studies--more detailed studies than those EPA uses to its HRS ranking. Like the HRS, the DPM evaluates hazards, contamination pathways and both human and ecological receptors. One of the more significant differences between HRS and DPM is the DPM system places 5 times greater weight on human health effects than on ecological effects. Regardless of its DPM

ranking, a site that has been listed by EPA on the NPL is accorded priority for cleanup funding.

Base Closure Priorities

In order to protect funding in the base closure appropriations account, the 1988 base closure law prohibited use of that source of funding for environmental restoration of bases to be closed. Cleanup funding was to be derived from the existing DERP account. This set up an clear conflict between DERP's "worst-first" policy of directing allocating funding to the most hazardous sites and the 1988 base closure law, which mandated complete closure of affected bases within 5 years. This conflict was addressed by the 1991 base closure amendments, which established a base closure sub-account for environmental restoration.

THE BASE CLOSURE PROCESS

The BRAC I Commission

After enactment of P.L. 100-526, the 1988 BRAC Commission--which became known as BRAC I--had approximately 2 months to re-do its analysis so as to be able to certify, as the new law required, that the bases recommended for closure and realignment had been identified by "reviewing all military installations inside the United States."

The Commission proceeded in two phases to identify bases to be closed or realigned. In phase I, an inventory of candidate bases was identified through a review based on mission categories and military value factors. In phase II, the inventory was refined through consideration of costs, savings and a limited look at environmental impacts. Environmental assessment was based on available data and concluded that impacts of closure would generally be positive (1988 Commission, 23). During phase II, an estimate was made of the "payback period" over which the costs of realigning or closing the facility would be recovered. The BRAC I Commission chose, as a criterion for its final screen of candidates, the recovery of the costs of the closure--within 6 years after completion of the closure--through cost savings and sale of excess property.

The BRAC I Commission submitted its report on December 29, 1988. In this report, it recommended the closure of 86 installations; the partial closure of 5 others; and the realignment of 54 others. In a November 1989 analysis of the recommendations of the BRAC I Commission, the General Accounting Office examined recommendations for 15 of these bases and concluded that, for these 15, the Commission had overestimated annual savings from its recommendations by 27 to 35 percent, and had underestimated the number of years required to payback the closure costs (29). Most of the operating cost savings result from personnel reductions. Offsetting costs of base closure

include the costs of new construction to accommodate surviving portions of the realigned mission at another location.

Disposal of Property at Closing bases

One of the key recommendation made to the Department of Energy by the Advisory Committee on Nuclear Facility Safety was that land use planning should be adopted as the basis of a practical, workable cleanup policy (9). Land use planning, the Committee concluded, "would lead naturally to the appropriate selection of new cleanup criteria" based on a site-specific risk assessment (10). Every student of public policy must remember that Federal land use planning stands as a symbol for erosion of States' rights. In this case, however, the planning is for the use of land that is already in Federal ownership and, unless it can be cleaned up, is likely to remain so.

Restrictive covenants prohibiting certain actions on, or use of, property can be included in deeds of sale. At the present time, however, there are several States with statutory limits on the time period over which such restrictive covenants may remain in effect. Moreover, the transfer of the property in no way diminishes Federal responsibility for hazardous or toxic materials later found to require remediation.

Community Re-use Plans. The 1988 legislation directed DOD to work with local authorities in developing property re-use plans and in identifying other ways to mitigate the economic impact of the base closures. At the time of enactment, it was envisioned

that the prime locations of many of the bases would make them valuable for residential and office development, industrial parks, regional recreation sites, and local airports.

Land Value Depends on Cleanup Standards. In an aside that will be decisive for numerous bases, the BRAC I Commission noted that the need for cleanup of hazardous and toxic wastes "may affect property disposal and reuse plans for excess property" (1988 Commission, 23). Directly related to the Phase II calculation of payback period is the question of "How clean is clean enough?" Both the BRAC I Commission and the GAO estimates of the payback periods anticipated receipt to the Federal Government of about $1.35 billion from the sale of land no longer needed by DOD (GAO, 33). However, the selling price for this land will be a function of not only the real estate market at the time of sale, but also of whether it was cleaned up to levels allowing unrestricted use. Also, in some cases, the land is unlikely to ever be available for sale, due to the Federal property disposal procedures established by or invoked in the 1988 legislation.

Federal Property Disposal. The 1988 BRAC legislation retained the existing procedures for disposal of real property by the Federal Government. However, the authority normally exercised by the head of the General Services Administration to dispose of Federal real property were delegated to the Secretary of Defense for the purpose of base closure. Unrestricted

transfer, without payment of fair market value, was authorized among DOD agencies.

Two sources of conflict exist between Federal and local governments in putting closed bases to beneficial local use. One has to do with Federal property disposal laws and regulations. The other has to do with cleanup of contaminated land under CERCLA.

Conflict Between Reuse Plans and Procedures. There is an incompatibility between Federal environmental law, Federal property disposal procedures, and the encouragement of local land re-use plans. Despite a desire by a local government reflected in a re-use plan, for which the local government probably received DOD assistance in developing the plan, the community may take ownership of the land, with or without payment, only after a lengthy process has determined that neither DOD nor any other Federal agency has a need for the land.

Procedures used by GSA and, therefore applicable to property disposal under BRAC legislation, establish a hierarchical process for identifying the best use of property deemed by one Federal agency to be "surplus" to its needs. This process is intended to prevent inappropriate sale to private parties of land purchased at taxpayer expense where another agency has need of similar property and would otherwise have to purchase it, perhaps at a higher price, from a private party. Numerous Federal laws require making surplus property available without cost to a Federal, State or local public entity for specified purposes,

such as historic preservation, wildlife protection, meeting a need for a local airport, or assisting the homeless (Stewart B. McKinney Act, 42 U.S.C. 11301, *et seq.*).

As already noted, surplus property is first offered to other DOD agencies at no cost. Second, if no DOD agency has need for the property, it is offered for use in assisting the homeless. Third, if no agency requires the land for that purpose, the property now surplus to one agency's needs is offered at fair market value to any other Federal agency. Fourth, if no Federal agency wants the property, it is declared "excess" and is offered to State and local governments, where for a number of purposes there are laws authorizing the waiver of charges. Fifth, the property is offered for sale on a competitive basis.

Disposal of Land Subject to CERCLA. Section 120(h) of CERCLA requires that any deed for the transfer of Federal land on which hazardous material was stored, released or disposed of must contain relevant information and a covenant warranting that:

> "all remedial action necessary to protect human health and the environment with respect to any such substance remaining on the property has been taken..." (SARA, Section 120).

The October 1991 report of the Defense Environmental Task Force, required by 1990 legislation amending the base closure process, identified alternatives for changing the land use of certain portions of closing bases concurrently with, or prior to, cleanup. The task force concluded that Section 120(h) does not

apply to transfer of land between Federal agencies, nor does it apply to lease of land, including lease-purchase arrangements. The task force concluded, with concurrence from EPA, that EPA's listing of a base on its National Priorities List does not delimit the contaminated, or regulated, area subject to CERCLA. Rather, a study must be done by DOD to identify the extent of contamination and, thereby, define the area restricted from sale under Section 120(h). Therefore, "clean" portions of bases listed on the NPL may be parcelled off and disposed of prior to the remedial action.

The more difficult question arises where the remedial action required operation of a treatment or recovery system over an extended period of time. In the case of groundwater contamination, it may take 20 years of treatment to complete the remedial action. In that case, the exact legal meaning of "a remedial action...has been taken" may be relevant. Interim reliance on leases and lease-purchase agreements could allow DOD to receive rents for use of the property. However, the requirement in the 1988 BRAC law to dispose of the property within five years would not be met.

BRAC I Environmental Restoration Costs

According to testimony of the Comptroller of the GAO, at the time of the BRAC I report to Congress, DOD was estimating the cost of environmental restoration of bases designated for closure to be $674 million: Army, $549 million; Air Force, $115 million;

and Navy $10 million (QTD HASC Report #101-21, 317). Subsequent to the report, GAO estimated that an additional $266 million would be necessary to cover restoration costs that had been overlooked.

The BRAC I Commission determined that, since DOD already was legally obligated to clean up hazardous and toxic waste contamination on military bases, the costs of this environmental restoration should not be attributed to the base closure process. The logic of this conclusion is clear and defensible. In its November 1989 analysis of the BRAC I Commission recommendations, the General Accounting Office concurred in principle (44-50). Logic, however, does not automatically make funding available.

Jefferson Proving Ground. In at least one BRAC I case, Jefferson Proving Ground in Indiana, the artillery range became subject to corrective action under the Resource Conservation and Recovery Act by virtue of being recommended for closure, since active artillery ranges are exempt from the Act. This was the one case where the General Accounting Office concluded that the BRAC Commission had omitted significant environmental restoration costs that should have been included in its break-even analysis (36-37). The added cost of cleaning up the firing range would increase the time to recover closure costs from the BRAC Commission's estimate of 6 years to from 38 to 200 years, at an additional cost of $57 million to $250 million, depending on the standard to which the installation was cleaned up.

Presidio. The closure of Presidio of San Francisco, an historic Army base set on a hill overlooking San Francisco Bay, was expected to produce immediate payback well in excess of closure costs through sale of real estate valued at $555 million. Environmental restoration costs, estimated to be $9.9 million, were not included in the calculation. Subsequent to the Commission's report, it became clear that (1) the property would never be sold if normal Government property disposal procedures were followed, because both the Navy and the National Park Service wanted the site; and (2) the citizens of San Francisco would never allow the beautiful site to pass into private hands and be commercially developed. The outcome? Most of the land is being turned over to the National Park Service at no cost, and negotiations continue on the costs of environmental restoration (Army believes its original estimate was about right--the National Park Service estimates that it will cost more than $82 million) and who should pay them. Before the end of 1989, the BRAC I Commission had reduced its estimate of revenues from land sales from $555 million to $36.5 million, and had changed the payback period from "immediate" to "never."

Aberdeen Proving Ground. A 100-acre section of this former Nike Missile Site at the Aberdeen Proving Ground in Maryland is listed for closure in the BRAC 91 report. In the 1920s, the area was the primary training school for the Army Chemical School. In 1942 it was designated the Army's Chemical Warfare Center. Then from the 1950s until 1976, it was the site of two Nike missile

batteries. The site is contaminated with napalm-gasoline mixtures, white phosphorous, high explosives, and unexploded ordinance, both incendiary and chemical. Some of the rounds contain phosgene, mustard gas and tear gases. In addition, there are sites contaminated with the normal military wastes--solvents, acids, and various fuels. In the latest completed study of alternatives for restoring the site, the Army admits that clearing the land for unrestricted use is neither technically nor economically feasible (USATHMA, Aberdeen, 2).

Fort Meade. The firing range at Fort Meade, Maryland, was part of the 9000-acre tract identified for closure in the BRAC I report. The tract, which abutted the Federal Patuxant Wildlife Research Center, was contaminated both above and below ground with unexploded ordinance. The Army was able to identify no economically feasible way to clean up the land. The only way remotely possible technically would involve excavation and, thereby, destruction of large tracts of wetlands, which serve as valuable habitat for wildlife. In October 1991, Congress enacted legislation turning 7600 acres of the land identified for closure to the U.S. Fish and Wildlife Service, to be added to a the Patuxant Center with public access heavily restricted.

ESTABLISHING CLEANUP GOALS AND STANDARDS

CERCLA established no specific cleanup standards of its own. Rather, it established several levels of criteria for screening and evaluating cleanup alternatives and provided mechanisms for

coordinating and enforcing the standards established in other laws. It also established a process for addressing contaminants, or mixtures of contaminants, for which no standards yet exist.

The cleanup standards--whether chemical-specific, location-specific or action-specific--are established in Federal or state law or in EPA regulations. Standards are stated in, or derived from, such laws as the Clean Water Act, the Clean Air Act, the Toxic Substances Control Act, the Safe Drinking Water Act and the Resource Conservation and Recovery Act (RCRA).

Legal Sources of Cleanup Standards

The Clean Air Act restricts release into the air of certain hazardous substances during incineration processes. Because incineration is one means of remediating hazardous and toxic waste sites, the Clean Air Act has substantial influence on selection of cleanup methods. Two examples of the use of incineration in remediating sites are the incineration of large quantities of soil contaminated with explosives and incineration of chemical weapons in order to render the residue non-toxic.

Standards under the Clean Air Act include both technology-based standards, where the "best available" or "best practicable" technology in the industry must be used, and "maximum contaminant levels" (MCL)--quantitative, measured limits.

Releases of contaminants into surface streams or rivers are regulated under the Clean Water Act. Strict standards apply to point source releases of pollutants, such as pipeline outlets,

and more general restrictions apply to non-point sources such as, runoff across land. Permits are required for all point sources of pollution, as well as for all disposal of dredged or fill material in broadly-defined wetlands.

Discharges into groundwater are regulated under several statutes, including the Safe Drinking Water Act, which sets strict standards for aquifers that are--or could be--used as sources of drinking water.

Relationship of CERCLA and RCRA

There is substantial overlap between RCRA and Superfund. RCRA addresses primarily the management of active waste disposal operations. However, when applying for a new or extended permit to operated a RCRA-approved disposal facility, one becomes subject to requirements for "corrective action" at contiguous sites owned by the same party. Of the approximately 265 DOD facilities that currently require RCRA permits, more than 100 are also CERCLA sites listed on the NPL (McCrillis).

RCRA and Superfund have confronted the worst of all situations: mixtures of virtually every hazardous and toxic substance known to humans, both naturally occurring--such as lead and mercury--and human-made compounds, released into all environmental media: air, soil, surface and ground water, underwater sediments, and biota. Sometimes, the technology to permanently clean up the "toxic soup" does not exist. More

often, the complex mix of methods of dealing with the pollutants results in residual risk or uncertain results.

Although EPA has made a number of changes to resolve policy and procedural inconsistencies between RCRA and CERCLA, problems still exist. When both laws apply to a site, a decision must be made which law, procedures, level of detail, and decision-making process will be adhered to. For example, States often argue in favor of cleaning up contamination as a RCRA corrective action site. Under RCRA, States have the authority to select the remedy to be implemented. In contrast, under CERCLA, States make recommendations to EPA, but EPA retains final remedy selection authority.

In its October 1991 report, the Defense Environmental Response Task Force continues to cite differences between RCRA and CERCLA as a principal cause of delay, inefficiency and high costs in cleaning up facilities (18-20). DOD staff report that much time and effort is spent negotiating a decision-making process. They ask, "What is the cost associated with lack of clarity regarding who is in charge?" (McCrillis).

Regulation of Carcinogens

Fundamental to establishing cleanup goals is the determination whether there is a level below which no adverse effects are expected--the threshold level. For some substances, primarily carcinogens, there does not appear to be a *safe*

threshold level, that is, a level below which no cases of cancer would be expected to occur.

The Delaney Clause. Because no safe threshold could be established for carcinogens, the Delaney Clause--which was enacted in the Food, Drug and Cosmetic Act of 1960--prohibits any detectable level, determined by any available technology, of carcinogens in substances intended to be consumed. A few years ago there was a concerted effort to enact legislation overturning the Delaney Clause. The argument in favor of overturning was that, as technology advanced and more sophisticated laboratory methods became available, smaller and smaller concentrations of carcinogens were detectable and more products were threatened by the "zero-tolerance" standard. It was argued that the regulated level should be established based on a quantitative assessment of risk and cost. The lobbying effort failed to overturn the Delaney Clause. However, application of the Delaney Clause was not extended to situations of environmental exposure, as opposed to product consumption.

Carcinogen Contaminated Soil at Ft. Valley Forge. The Army Environmental Hygiene Agency (AEHA) conducts health risk assessments on all DERP sites, including those associated with base closure. In 1991, the AEHA conducted an analysis of 181 acres of land that previously had been part of the Fort Valley Forge Army Hospital in Pennsylvania (AEHA, Valley Forge). This site was transferred out of Federal ownership prior to the current base closure process, and the assessment was undertaken

as part of the Formerly Used Defense Sites portion of the Defense Environmental Restoration Program. However, the example is instructive of trade-offs that are encountered in considering cleanup levels in the light of subsequent use of the property. The land around the hospital was provided to the local community for use in developing recreation areas. The community set up soccer and softball fields on the property.

When the Army owned the property, it had been the site of a medical waste incinerator and a landfill. Carcinogens were detected in the soil. The standard normally applied by EPA in the CERCLA program to determine detectable, but acceptable, presence of carcinogens is a maximum contaminant level associated with a $1x10^{-4}$ to $1x10^{-6}$, that is--one in 10,000 to one in a million--risk of getting cancer (Risk Assessment Guidance, 7.10-7.13). The AEHA analyzed the risk in accordance with EPA's Risk Assessment Guidance manual and concluded that, based on application of the more stringent EPA guideline, a cancer risk of $1x10^{-6}$, the recreational use of the site was acceptable, except that the area where the landfill had been could not be used as a playground for children 6 years old or less. The additional risk to which that age group would be exposed--that they could reasonably be expected to ingest some quantity of the soil--would require either a restriction on the land use or treatment or removal of the soil (AEHA).

RESEARCH AND DEVELOPMENT

The absence of satisfactory technological solutions to many of the hazardous waste sites argues heavily for reductions in the production and use of hazardous substances and for an aggressive program of research and development (R&D). EPA has such a program, as does DOD. The desire to demonstrate an emerging technology sometimes becomes a factor in selecting remedial actions. Bioremediation--the use of natural biological means, such as enzymes--is being strongly pushed by EPA. DOD allocated some of its DERP R&D money to the Army Corps of Engineers, including $14.6 million for fiscal year 1992 (Hatch, 4). One of the Corps efforts is to identify methods of determining safe cleanup levels for sites in the DERP program. The Corps believes that the analytical methods it has developed and demonstration projects such as a bioremediation alternative--composting--for managing contaminated soil have the potential to save hundreds of millions of dollars without exposing humans or the environment to unsafe conditions.

Preliminary Pollutant Limit Value (PPLV). One of the areas into which the Corps of Engineers is conducting extensive research to address the question of "How clean is clean?" is "fate and effects"--the overall physical and chemical conditions of the contaminants. The foundation of this research is the Corps' extensive experience in examining the environmental impacts of disposing of dredged material as sea, at sites permitted by EPA under the Ocean Dumping Act. This research has

shown that the physical environment at a given site significantly affects the ecological effects of a pollutant. For example, certain contaminants in the dredged material may adhere to other particles and, thus, be stabilized in the specific environment. Based on this, the research attempts to establish a PPLV specific to the contaminants and conditions at the site under study in order to identify cleanup levels that are considered to be "safe"--that is, safe enough (Hatch, 8).

The Corps cites two examples of cost savings being achieved due to this method, rather than relying on a general, laboratory derived "safe" concentration: Louisiana Army Ammunition Plant and Rocky Mountain Arsenal (Hatch, 8). Although neither site has been recommended for closure, the examples are instructive, because similar contamination is found at other military facilities.

Louisiana Army Ammunition Plant. At the Louisiana site, the EPA target for cleanup of the particular contaminants was 15 parts per billion (ppb). Using PPLV, the Corps was able to demonstrate to EPA's satisfaction that--based on the conditions of the site--a remedy that would leave a residue of 100 ppb in the soil was "safe enough." This change was estimated to reduce the cost of cleaning up the Louisiana site from $134 million to $44 million (Hatch, 8). Incineration of the contaminated soils was completed in 1990, and the site has been revegetated (DOD Annual Report, 1990, B-51).

Rocky Mountain Arsenal. Rocky Mountain Arsenal carries the distinction of holding--in a tie with one other base--an EPA hazard ranking score of 58.15, the highest HRS score all of the military sites listed on the NPL. The Corps estimates that its PPLV research has the potential of saving $4 billion at this site alone by allowing revision of the target level for soil cleanup. Dollar figures in that range reveal the impossibility of cleaning up Rocky Mountain Arsenal to unrestricted use, based on current methods of setting cleanup standards. In addition to extensive groundwater contamination both on and off base, the soil at this site is contaminated with pesticides, mustard gas and nerve agents, heavy metals, organic and inorganic compounds, acids and petroleum products (DOD Annual Report, 1990, B-80). Based on its PPLV research, the Corps of proposing that EPA's target of 2 ppb be changed to 600 ppb (Hatch, 8). Although some interim remediation has taken place--as of early 1991, $315 million has been spent on the site--major decisions on target contaminant levels remain, including the method and cleanup target for soil cleanup. The feasibility study is scheduled to be completed in 1993, at which time a remedy will be selected.

Composting of Contaminated Soil. One example of bioremediation R&D being conducted in the DERP program is the use of composting, rather than incineration, to detoxify soil contaminated with explosives and organic chemicals. Composting can remove 99 percent of the contaminants at one-third to one-half the cost of incineration. The end product is usable as fill

material. This method was tested during 1991 at Umatilla Army Depot, where the optimal composting mixture was determined.

CONCLUSION

Review of available literature and examination of case studies confirms the unspoken, but understood, fact that generations to follow will be required to tolerate greater risks from hazardous and toxic materials because of the production, management and disposal practices of the past fifty years. Because of the political cost of speaking these words, no consensus has been achieved on what portion of this generation's resources should be devoted to cleaning up the hazardous and toxic wastes as best we can with current technology. Because we have not found a generally accepted analytical framework for establishing acceptable levels of risk, realistic, site-specific cleanup standards elude us. Much of the time, expertise and funding available is spent in debating issues of procedure and authority, with discouraging results on the ground.

With commitment of substantial financial resources we can, with the possible exception of some groundwater contamination, contain the hazardous and toxic wastes. Many sites can be made "clean" and turned over to local communities for unrestricted use. There are other sites--firing ranges, for example--where we will be forced to accept a "national sacrifice area," but we can at least clear and monitor the surface and turn some of these sites into wildlife refuges. At other sites, huge investments

will be required merely to stop the spread of contaminated groundwater. There will almost certainly be a few sites where no safe alternative use is possible.

There is a fundamental conflict in environmental restoration, particularly at military bases being closed. For any given site, the State and community that ultimately have to live with the results do not have to pay for the solution. More correctly, the portion they pay through their taxes is so small and indirect that it does not affect their decisions on acceptable and unacceptable risks. This is one reason negotiations among DOD, EPA, States and communities are so difficult. It is easy to say that only candor and demonstrated trustworthiness will allow progress toward solutions. It is a different matter to achieve such conditions.

EPA sees itself as the defender of the communities, and yet, those same communities might -- given full understanding of the conditions and the risks to themselves and their offspring -- choose to accept a modestly greater risk at a lower price, if they were more directly affected financially in ways broader than fear of adverse effects on real estate values.

Admission that not all sites will be cleaned up for unrestricted use may adversely affect the base closure process. This could result in demands for greater information about environmental conditions prior to congressional consideration of base closure recommendations. It is not unreasonable to expect that a higher standard of cleanup will be demanded at a base

that a higher standard of cleanup will be demanded at a base being closed than would be acceptable if the base were staying open. This may be unrelated to measured or predicted human and environmental health effects, but rather may be related to the political process and uncertainties about future land use.

To some extent, this fear may be ameliorated by Federal legislation to override State statutes of limitations on deed restrictions. Such legislation could ensure that any such restrictions on a remediated waste site remain in effect for the minimum period necessary to dissipate the toxicity remaining in the soil or groundwater--four hundred years, perhaps--or in perpetuity. However, such legislation would also explicitly open the door to Federal land use planning and, thus, could become a States' rights issue. A more indirect and perhaps more acceptable approach would be for Federal records of decision on remedial actions to include, as a prerequisite for Federal funding, a requirement that States ensure the perpetual effect of any deed restrictions through whatever legislative means necessary.

As discussed earlier, the fifth balancing criterion guiding EPA's in selecting remedial actions is that the alternative must be achievable at a justified cost. More top level attention should be devoted to discovering management and technical changes that would reduce costs. Legislation may be necessary to make CERCLA and RCRA more consistent, particularly in the level of detail of study required at various stages, in early

determination of which statute will govern at a particular site, and possibly in establishing one decision maker for remedy selection under both laws, either the State or the EPA.

The Advisory Committee on Nuclear Facility Safety argues that we must establish realistic, site-specific environmental cleanup goals based on risk/cost-benefit analysis, and that land use planning is the key to doing so. If this is correct, the current CERCLA and BRAC processes are not approaching the problem effectively or efficiently.

The EPA and DOD should move aggressively toward development of standard remediation packages for relatively straight-forward, frequently occurring site conditions. The use of these "off-the-shelf" designs--perhaps with options--would reduce the study and design time and costs for many sites without compromising the quality or safety of the remedial action.

For more complex sites, a land use planning approach should be taken. Unique solutions will require greater time and design costs. The current regulatory environment--where air, water, groundwater and toxic substances are separately regulated and each regulatory regime must be satisfied--is not a practical means of confronting the thousands of hazardous and toxic waste sites requiring cleanup.

The movement within EPA to begin addressing composite environments, rather than separately regulating each environmental media -- air pollution, water pollution, land management and toxic waste disposal, for example -- is a step

toward recognizing the real world interaction of pollutants and the media they affect. In addition, greater reliance need to be placed on risk-based regulatory standards, although there are certain to be contaminants and circumstances where the level of uncertainty is great enough to justify a worst-case scenario.

The management of CERCLA and RCRA programs within EPA must be made more consistent, and this requires confronting intra-agency "turf" issues. This change in culture is necessary to allow development of site-specific cleanup standards based on the measured and predicted fate and effects of toxic wastes under the conditions prevailing at each particular site.

Environmental restoration--with its strict, joint and several and retroactive liability--has established an adversarial relationship between regulators and regulated. Dedicated environmental regulators fear that any compromise or risk acceptance on their part will be taken advantage of by those responsible for cleaning up sites. Given past performance of other Federal agencies and the penchant for secrecy in DOD programs, there is much history and evidence to support this fear.

There is, I believe, another motive present in the regulatory environment: retribution. It is tempting--indeed, satisfying -- to approach remediation with an attitude of making the polluters pay dearly for what they have done. Unfortunately, as was so rightly observed in a "Pogo" cartoon of the 1960s, "we have seen

the enemy and he is us." Retribution is not free. On the contrary, it is very costly. We must strive to find and follow the narrow line between liability--that is, responsibility--and revenge. Suspicion, defensiveness and retribution do not produce solutions.

The closure of a military base is a traumatic event in the life of a community. Misleading statements by politicians and representatives of the military can destroy the basis for cooperation necessary to decide, in a public forum, what alternatives are available, at what cost and at what risk. Open and candid dialogue with local communities must take place.

One of the convictions behind the base realignment and closure process was that large revenues could be realized from the sale of commercially valuable property held by the military. One of the strong convictions behind CERCLA was that cleanup of existing contamination should be held to no less a standard than would be applied to de novo decisions affecting production and development. The efficiency objective of base closure may turn out to be goal that we cannot achieve. The laudable CERCLA standard may turn out to be a luxury we cannot afford. While efficiency and technical expertise are essential, efficiency and expertise cannot answer the value-laden question "How clean is clean enough?"

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